

### 3. Vegetation

#### A. Insects, Diseases and Disturbances

This section consists of two portions. The first addresses insect and disease populations. The second focuses on managements influence on disturbances in the context of on undesirable occurrences of fire, insect and disease outbreaks.

##### 1. Insects and Diseases

###### Key Points

- Monitoring of insects and disease levels is conducted on an annual basis. Since 2004, although damage has occurred by larch case bearer, jack pine budworm, and prolonged dry spells, native and naturalized insect pests have run their course.
- Of great concern is the eminent threat of emerald ash borer. The Chippewa is acting proactively through coordinated partnerships and research projects to be able to respond. Building resilience in the ash resource and slowing the spread of emerald ash borer once it arrives are the two primary objectives concerning emerald ash borer.
- The other major threat facing the Forest in the near future is gypsy moth. It will be important for the Forest to coordinate and communicate with all its partners as movement of gypsy moth continues to be monitored.

###### Monitoring Question

Are insects and diseases populations compatible with objectives for restoring or maintaining healthy forest conditions?

###### Results

Insect and disease populations and trends have been monitored through aerial surveys and have been reported annually for the 2004 Forest Plan. These surveys have been accomplished through the partnership of the Minnesota DNR Forest Health and Resource Assessment Unit and USFS State and Private Forestry.

Trends on the Forest appear to reflect what is going on statewide regarding forest health issues. The following brief discussions highlight the areas of concern and reflect categories in the tables in the full report. (The full report is part of the project file and is available upon request.)

**“Unknown”:** This classification of damage reached a high of 3,998 acres in 2004 and dropped to 10 acres in 2010. This is most likely due to the increasing skill of crews doing mapping and ground truthing for these aerial surveys.

**Tamarack:** On the Chippewa, there are 16,261 acres of tamarack cover type (FS ownership), plus tamarack occurs as a component in other lowland, as well as upland, cover types. Tamarack damage a mortality has been on the rise since 2007, with more than a fivefold increase from 2007 to 2010. In 2010, there were 2,805 acres of tamarack damaged on the Forest (all ownerships) based on aerial

surveys. Of these, 15.4% (432 acres) was Forest Service ownership. The balance was 77% State, 6% Cass County, 2% private. Stands affected range across the spectrum of age classes. The majority of current damage is from larch casebearer.

**Larch casebearer:** Since 2004, acres of tamarack damaged by larch casebearer have increased by more than 3,200%. In 2010, severity on the affected acres on the Chippewa were classified as, “trace” on 1,602 acres, “light” on 828 acres, “moderate” on 332 acres, and “heavy” on 25 acres.

Larch casebearer is an exotic insect which reached the Lake States in the 1950’s and is now considered to be “naturalized”. Casebearer adults are moths that fly from late May to August and lay eggs on needles. Larvae hatch from the eggs and bore into needles and “mine” during the summer. The larvae use a hollowed out needle as a portable shelter or “case”. They overwinter in this case, fastened to a twig, at the base of a bud. In the spring they resume needle mining before pupating and changing to a moth to complete the life cycle. Each larva needs to feed on 24 to 76 needles to complete its development. The most severe damage is done by the larvae in the spring of the year. Damaged trees and stands look off color, tan or brown. Needles have to be examined carefully to see the entrance hole in the mined out needle or to find the cases containing the larva.



Figure 1 Larch casebearer damage.

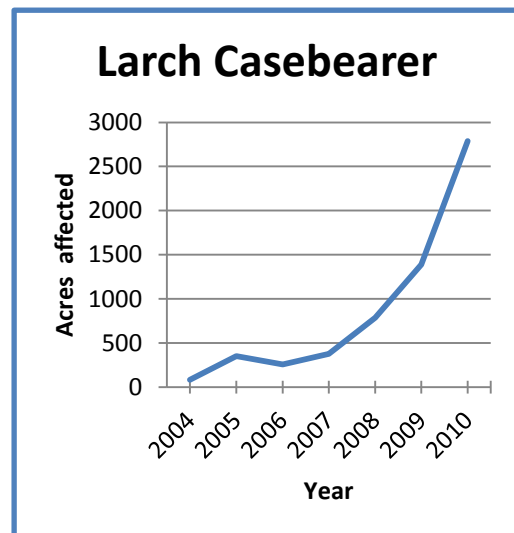


Figure 2 Larch casebearer trend over the monitoring period.

**Jack pine budworm (JPB):** JPB is a native pest that primarily defoliate jack pine, but will also defoliate white and red pine. It experiences natural cycles where the population builds and then crashes. The Forest been enjoying a hiatus from this forest pest since 2009, following a population build up earlier in the reporting period. JPB is currently being seen in other parts of the State, but not on the Chippewa NF.

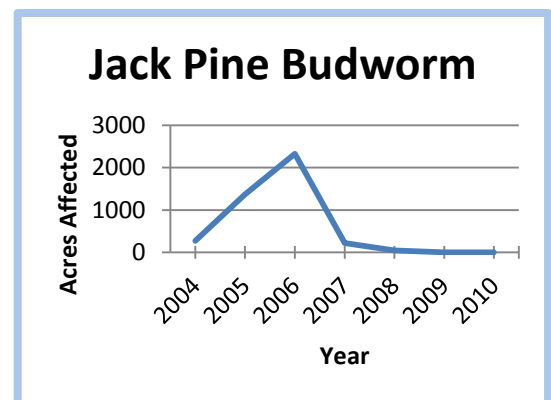


Figure 3 Affected acres by jack pine budworm.

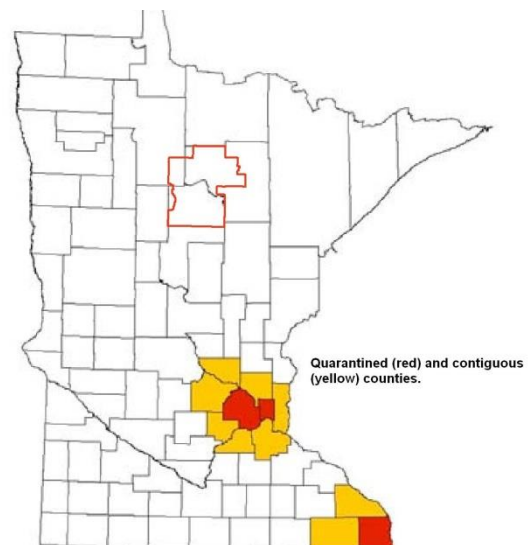
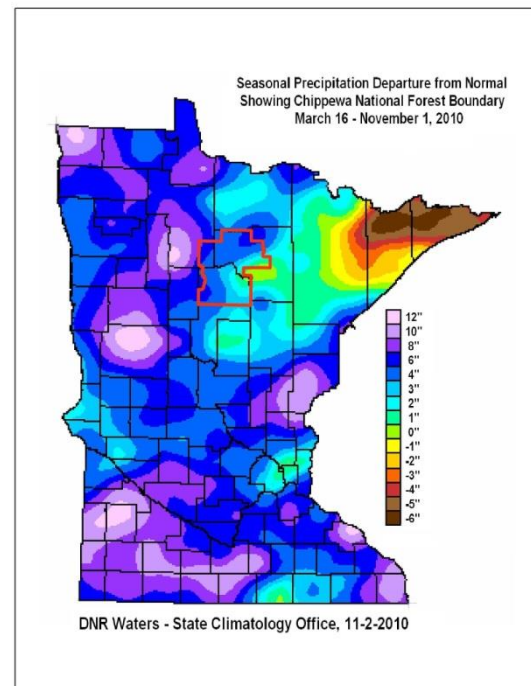
### ***Prolonged dry spells and droughts***

Many agents affecting forest health are opportunistic. Trees stressed by drought are more vulnerable to these agents. Since 2004, the Forest experienced a sustained drought for the four growing seasons prior to 2010. Though the spring started out dry in 2010, abundant precipitation started in June and continued the September. The Forest went into the winter with lakes and wetlands full, and good soil moisture.

***Emerald ash borer (EAB):*** EAB, *Agrilus planipennis* Fairmaire, is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. On May 13, 2009, an EAB population was found in St. Paul, Minnesota. A quarantine was enacted in the Twin Cities' counties of Hennepin and Ramsey. Houghton County in southeastern Minnesota was also quarantined due to the close proximity of EAB in neighboring Wisconsin. Results from dendrochronological studies of EAB-infested trees in the Twin Cities indicated that the St. Paul infestation dates back to 2006. This was one of the quickest discoveries of an EAB infestation to date.

EAB poses an eminent threat to the Chippewa National Forest. We are closely working with partners to limit the introduction of EAB to the Forest and surrounding area. The Forest has developed and implemented a firewood policy. It is following guidelines to add diversity to ash types in order to maintain forest cover on these sites after EAB arrives. The Forest coordinated a Black Ash Symposium with the DNR and Minnesota Forest Resources Partnership. Held in May, 2010, the Symposium was attended by over 200 forest managers from many agencies and states. Participants learned much about northern Minnesota's black ash resource and emerald ash borer. In 2010, the Forest Supervisor signed an EAB response Categorical Exclusion to facilitate a quick sanitation response once EAB is discovered on Forest Service lands.

***Ash seed collection:*** The Chippewa started an ash seed collection program in 2009. During the summer of 2009 the Forest identified 509 ash trees (257 green and 252 black), tagged them, GPS'ed coordinates, collected leaf vouchers, and photographed the trees according to National



Seed Lab protocols. Identification of all 509 trees was verified by the J.F. Bell Museum of Natural History, University of Minnesota. In the fall of 2009 and 2010 seed was collected from those individuals that had a seed crop. The seed was sent to the National Seed Lab. Seed will be collected from the remaining trees until seed is collected and stored from all 509 ash that are cataloged.

**Gypsy moth (GM):** Most gypsy moths trapped in Minnesota have been collected in northeastern Minnesota's St. Louis, Lake and Cook Counties (the Superior National Forest), but the gypsy moth is at the Chippewa's door step. The GM front has been moving west and the Forest is starting to feel the pressure. Trapping on the Forest has been conducted by both the Minnesota Department of Agriculture (MDA) and the USDA Animal and Plant Health Inspection Service (APHIS). MDA sets traps on a grid system that rotates through the State. The Forest was a part of this grid in 2009. If a moth is trapped one year that same area will be delimited trapped the following year to learn whether a population has been established, or if a male moth was carried in by the wind.

Over the past few years individual moths have been caught, usually as single catches in traps. Delimited trapping generally yields no moths the second year, but there are a couple of cases where a moth was caught the second year.

In 2010, most of the Forest was outside the MDA trapping grid. Some traps were set by MDA in the NE portion, and more were set by APHIS across the Forest, including delimiting traps where moths were caught in 2009. Three moths were caught in 2010, in different traps, one each near Island Lake (Itasca County), Swift Lake (Cass County) and Caribou Lake (Itasca County). The Island and Swift Lake sites were both delimited trapped in 2010 by APHIS. The catch south of Caribou Lake was a single male moth in a MDA trap. All three of these sites will be delimited trapped in 2011 by APHIS.

The figure below shows how GM catches have increased over the monitoring period in the State, and gives a picture of how the Chippewa is increasingly threatened by this exotic pest. The Forest is not yet at a point where MDA has proposed any treatments. When it's determined a population has become established on the Chippewa, there will be coordination with the MDA, APHIS, the Forest, Counties, and the Leech Lake Reservation to determine the actions to be taken.



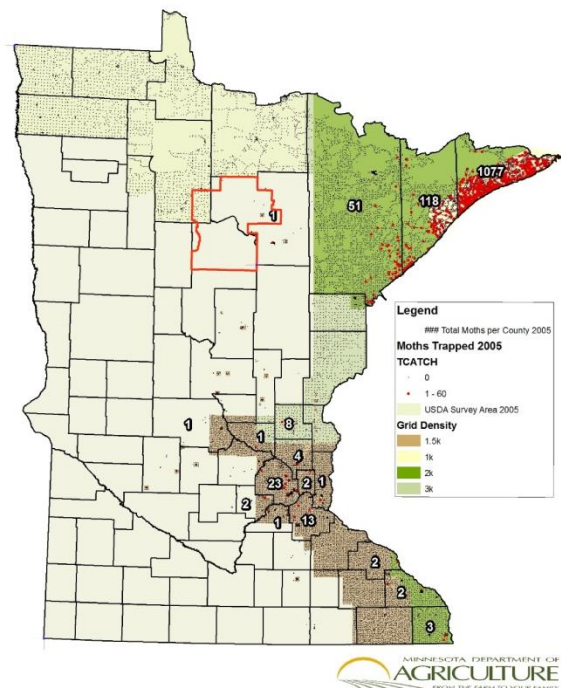
**Figure 4:** Collecting seed from a green ash tree.

**Table 3.1.** Forest GM trapping results for the monitoring period.

Year	Total traps set on the Forest	Moths Caught on the Forest
2010	245	3
2009	647	1
2008	30	4
2007	0	0
2006	370	0
2005	90	0



2005 Minnesota Gypsy Moth Results



2010 Minnesota Gypsy Moth Results

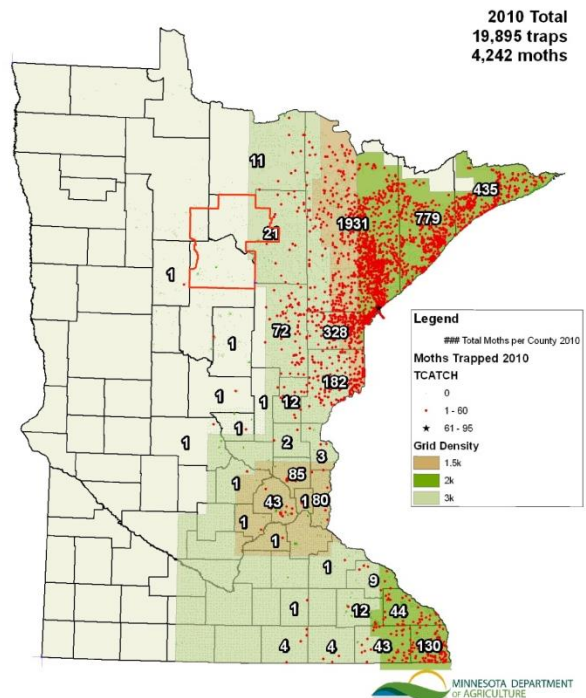


Figure 5. Red dots indicate gypsy moth catches in 2005 and 2010. Numbers indicate total moth catches per county.

**Forest Health Workshops:** Each year the Forest has hosted and coordinated an interagency forest health workshop. Attendance has grown each year and in 2010 there were over 80 individuals who attended from the Forest Service, Minnesota DNR, industry, counties, the LLBO Reservation, the University of Minnesota and private forestry consultants. Forest health specialists from USDA State & Private Forestry, the Minnesota DNR, and various universities make up the cadre. The goal is to review current and coming forest health issues.

## New issues

Emerald ash borer, an exotic pest arrived in Minnesota just a few years ago, is discussed earlier in this section.

Changing climate may result in changes in habitat suitability of tree species, greater plant stress, and altered pest behavior. Trees experiencing changes in climatic condition such as drier summers may undergo greater moisture stress/decreased vigor and be more susceptible to bark beetle or other pest attacks. The range of pest species may also expand. Natural barriers or controls on populations such as extreme cold which kills overwintering larvae may not occur with warmer winters thereby changing population numbers and dynamics. (From "Silviculture and Climate Change" B. Palik, 2011)

## Implications

- Forest health issues on the Chippewa have been normal. The Forest did experience a drought during the monitoring period which ended in 2009. Native and naturalized insect pests that have been running their typical cycles over since 2004 may have had some advantage during the drought due to the stressed condition of trees. However, cycles have occurred and seem to run their course and come to an end without a lot of mortality.
- Of great concern is the eminent threat of emerald ash borer. This pest will reach the Forest in time. When it does the Forest's ash resource faces decimation. The Chippewa is acting proactively through coordinated partnerships and research projects to be able to respond. Building resilience in its ash resource and slowing the spread of EAB once it arrives are the two primary objectives concerning emerald ash borer.
- The other major threat facing the Forest in the near future is from gypsy moth. It's likely that treatments for GM could begin on the Forest's landscape sometime in the next decade. It will be important for the Forest to be coordinating and communicating with all its partners as movement of GM continues to be monitored.

## 2. Management and Disturbances

### Key Points

- Although individual tree mortality caused by a variety of insects and diseases is occurring, epidemics have not occurred. Forest management activities such as harvesting, fuels reduction, and prescribed burning have contributed to managing occurrences of fire, insect and disease outbreaks. The establishment of an emerald ash borer population in northern Minnesota is a threat in the future.

## Monitoring Question

To what extent is Forest management managing undesirable occurrences of fire, insect and disease outbreaks?

## Results

Total acres with forest health damage, in harvest and burn units, for the analysis period ranged from 11.9 to 122.5 acres. In the majority of stands affected, damage was limited to small patches within larger stands. None of the damage in harvested stands was correlated to the harvest events. Damage resulted from outbreaks of naturally occurring cycles of jack pine budworm, spruce budworm, aspen defoliation and larch beetle. There were also isolated incidents of flooding and decline which were not correlated to harvest treatments.

Correlations were seen between tree mortality and fire treatments in 2008 (50.4 acres), 2009 (65.4 acres) and 2010 (78.7 acres). Fire damage occurred in red pine and jack pine that was underburned. Red pine mortality on 32.1 of the acres in 2009 was due to pine bark beetles following prescribed burning conducted in 2008. This secondary effect probably occurred due to

trees being stressed by several years of drought prior to being underburned. Following this secondary stress factor, bark beetles were able to overcome these trees. No bark beetle damage was detected on the Forest in 2010.

## **Implications**

- Timber harvest is a tool used to promote changes in the landscape to accomplish forest composition and age class objectives. There were no insect and disease issues caused by harvest activities for the monitoring period. Silvicultural prescriptions are designed to maintain stand growth and vigor and reduce short and long term impacts by insects and diseases. For example, commercial thinning is designed to reduce stand density and individual tree stress resulting from competition for limited resources. It is probable that harvest activities are maintaining forest health across the landscape of the Chippewa National Forest. Opportunities to harvest also reduce standing fuels, improve the fire condition class, and reduce the likelihood of catastrophic fires.
- Prescribed fire is another tool used to accomplish Forest Plan objectives. There was some mortality found in red and jack pine following prescribed burning during the monitoring period. This mortality was observed, and limited to, one year post burn. No further mortality was detected in these stands in subsequent years. Depending on the goals for individual burns, objectives may include some mortality to accomplish wildlife or other objectives. The long term benefits of burning likely outweighs any short term damage that may occur to standing individual trees in burn units.

## **Recommendations**

- Identify a protocol and tracking mechanism that would provide information on tree mortality 1-5 years as a result of damage and stress on residual trees from burning.

More detailed information can be found in the project file and is available upon request.